

## Animalization of Industrial Structure Transformation on Economic Growth in Liaoning's Province

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### Abstract

Industrial structure and economic growth are independent. Based on the new statistical figures of Liaoning, this paper analyzes the contribution of industrial structure to economic growth of Liaoning Province with econometrics method. Then put forward some suggestions.

**Key words:** Industrial structure; Theory of grey system; Economic growth

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### INTRODUCTION

The change of industrial structure plays an important role in economic growth. When the economy develops to a certain stage, there will be an accelerated period. Meanwhile, the main driving force of economic rapid growth comes from the comprehensive and rapid transition of economic structure. In this process, it is likely to arise increase stages of some departments and industries in order to support this department and industry

to increase rapidly. Based on econometric model and take 2005~2009 Liaoning province statistic yearbook as its stylebook, this paper analyzes the effect of economic growth on Liaoning province industrial structure.

### THE GRAY CORRELATION ANALYSIS

As for the factors between the two systems, which change over time or different objects and the size of the correlation measure are called the correlation. In the development process of the system, if the trends of the two factors have consistent, that is to say, the higher degree of synchronization, the higher level degree of correlation and vice versa. Therefore, the gray correlation analysis is based on the similar or different degrees of the development between the factors—"Gray correlation". As a method of measuring the correlation between the factors, the theory of gray system promotes a concept of analyzing the gray correlation of each system and tries to seek for the value relationship between every subsystem and factors in the systems through a certain method. Hence the gray correlation analysis provides the developmental and change trend of a system with quantitative measure, which is suitable to the dynamic process analysis. This paper will apply the gray correlation analysis to the changes in Liaoning province industrial structure. We hope that we can find the relationship between Liaoning province economic growth and changes in industrial structure.

The calculation steps are as follows:

- [1] (1) Taking Liaoning province GDP in recent five years as reference series  $X_0 = \{X_0(t) | t = 1, 2, 3, 4, 5\}$ ; Taking three times the value-added of industrial as compared series  $X_i = \{X_i(t) | t = 1, 2, 3, 4, 5\}$ ; Taking the data in 2005 as the datum point, the method to make every data standardized (Dimensionless) is that divided GDP in every year and the value-added of  $i$  industry by the value-added

of GDP in 2005 and  $i$  industry, then the result is the data of dimensionless.

**Table 1**  
**Liaoning Province GDP in Recent Years**

Year	GDP	The value-added of primary industry	The value-added of secondary industry	The value-added of tertiary industry
2005	8047.3	882.4	3869.4	3295.5
2006	9304.5	939.4	4566.8	3798.3
2007	11164.3	1133.4	5544.2	4486.7
2008	13668.6	1302	7158.8	5207.7
2009	15212.5	1414.9	7906.3	5891.3

(2) Calculate the dimensionless compared series corresponding to the reference sequence and get the parameter  $X_i$ . The formula is

$$X_{i0} = |X_0(t) - X_i(t)|, i = 1, 2, 3$$

(3) Calculate compared series  $X_i$  and reference series  $X_0$ 's correlation coefficient  $\xi_i(t)$ ; Reference series  $X_i$  has three Compared series  $X_1, X_2, X_3$ . The correlation coefficient of every compared series and reference series in every time (every point in the curve) can be calculated by the following formula

$$x_i(t) = \frac{\min_i \min_t |X_0(t) - X_i(t)| + \beta \max_i \max_t |X_0(t) - X_i(t)|}{|X_0(t) - X_i(t)| + \beta \max_i \max_t |X_0(t) - X_i(t)|}$$

Among it,  $\beta$  is the resolution factor,  $0 < \beta < 1$ , generally,  $\beta = 0.5$ .

(4) Request for correlation

Because the correlation coefficient is the correlation value of compared series and reference series in every time so its number is more than one, but the information is too detract and not easy to compared comprehensively. Therefore, it is necessary to focus the correlation coefficient in every time into a value, that is request for its mean. As comparing several listed as reference series connection degree between the amount that, the formula of correlation coefficient as follows:

$$r_i = \frac{1}{N} \sum_{t=1}^N x_i(t)$$

Getting compared series to reference series:

the correlation coefficient of  $X_1$  to  $X_0$ :  $r_1 = 0.6833$

the correlation coefficient of  $X_2$  to  $X_0$ :  $r_2 = 0.9096$

the correlation coefficient of  $X_3$  to  $X_0$ :  $r_3 = 0.8496$

According to these data: the correlation between the value-added of secondary industry and economic growth in Liaoning province is the highest, reaching to 0.9096; followed by the tertiary industry is 0.8496, the primary industry is smallest, 0.6833. The correlation coefficient between the value-added of the secondary and

tertiary industry and economic growth is bigger. We can see that Liaoning province's economic growth is mainly depended on the growth of the secondary and tertiary industry.

## MEASURES AND ADVICES

According to the data analysis of economic measure above, we can know that the secondary industry is the most effective industry to stimulate economic growth of the whole economic in Liaoning province. Combined with the specific situation, if we need to realize Liaoning province economic sustainable steady and health growth, the industry structure adjustment must follow "Optimized to enhance the secondary industry, vigorously develop the tertiary industry and to strengthen primary industry" industry development guiding method.

(1) Speed up industry structure adjustment; keep to the new path of industrialization.

Liaoning province, as one of the old industrial base, to adjust industrial structure rapidly, to keep the new path of industrialization, to promote industrialization with IT and industrialization promote IT is the only way to realize Liaoning province industrial development. To strength the old industrial base improvement and adjustment, to speed up the industrial development, to structure new industrial group, to improve traditional industry with high-tech and advanced application technology is the guiding thought of Liaoning province industrial development. Recently, to promote the development of Liaoning province industry and step up to improve industrial economic benefit, we should do the following jobs: a Make full use of our province recent harbor conditions and advantages and to build Dalian as the international important shipping center in Northeast Asia; b invigorate the equipment manufacture and establish the vital modern equipment manufacture base in our country; c larger and stronger the advantaged industry, such as petrochemical, metallurgy and building materials in order to establish the vital raw materials industrial base in our country. To grab the historical opportunity to revitalize Dongbei area old

industrial base and basically complete this task through the effort of Twelfth Five-Year Plan. To basically realize the industrialization, to promote the increase of GDP in Liaoning province, through industrialization to increase the national income and enhance the support to service employment so that drive the increase employment.

(2) Make great effort to develop the tertiary industry and improve internal structure of it completely.

Nowadays it is service-oriented in the economic developed area in the world. As for the tertiary industry in Liaoning province, it plays vital influence to drive the economy. Therefore, the development of tertiary industry should be based on enhanced service features and the city center is radiated, to take commerce, finance, tourism and consulting as priority, to uphold the strategic of "Big trade, circulation and market", to plan to develop the commerce center in order to form "Commerce corridor" centered with Shenyang and multi-level business network. To adjust the commerce structure and form a series of modern circulation such as comprehensive shopping malls, supermarkets, distribution centers and chain stores. To set up sound establishment of state-owned financial organization system, financial market system and financial regulatory system, to well build the modern financial company system in state-owned bank and to actively develop securities, trust and investment and other non-bank financial institutions in order to cultivate rapidly the capital market, such as securities, the fund and so on. Meanwhile, to strength external cooperation in professional service field, to introduce advanced manage thought and technology, to enhance the development level and standard in professional service, such as accounting, auditing, lawyer, assets evaluation, supervision, quality certification, arbitration and fair.

(3) Take modern intensive ecological agriculture and the industrialized operation of agriculture to achieve sustainable development of agriculture.

The modern intensive ecological agriculture is the inevitable choice to structure adjustment, industry and product optimization, to enhance the agriculture overall productive forces, to rely on technology increasing output rate so that lead the countryside residents to common wealth in realizing socialist market economy and agriculture modernization process. To develop intensive ecological agriculture must depend on the industrialized operation of agriculture and keep the path of the industrialized operation of agriculture. These help us to realize the optimal allocation of agriculture resource and recombination of production factor in a larger and higher level, to improve the agriculture industrial structure adjustment and agriculture economic value, to solve the problem of agriculture and speed up the process of urbanization. Enhancing the farmers income steadily and promote the social and economic sustainable development in Liaoning province.

Through the constantly integration of "Three industries", we can let economy and society coordinated development in order to realize the completely revitalization of the old industrial base in Liaoning province.

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